



**University of
Zurich**^{UZH}

**Zurich Open Repository and
Archive**

University of Zurich
University Library
Strickhofstrasse 39
CH-8057 Zurich
www.zora.uzh.ch

Year: 2021

Ordinary injury, big surprise - Traumatic false aneurysm and arteriovenous fistula of the posterior tibial artery after civilian trauma: A case report

Scherer, J ; Schäfer, F P ; Kobe, A R ; Messmer, F ; Pape, H-C ; Rauer, T

Abstract: Introduction False traumatic aneurysm (FTA) or pseudoaneurysm and traumatic arteriovenous fistulas (TAVF) are rare pathologies in civilian trauma and mainly result from stabs or gunshot wounds. The posterior tibial artery as site of trauma is very rare. Presentation of case We report on a 39-year old female patient who was suffering from combined FTA and TAVF of the posterior tibial artery after falling into a wine glass. CT-imaging as well as duplex ultrasound and selective arteriography were performed, and two stent-grafts were inserted. Discussion Based on the presented case, incidence of the described pathology, treatment options and outcomes are discussed. Conclusion Adequate imaging in penetrating wounds to the extremities is crucial in order to provide diagnosis and treatment of concomitant lesions.

DOI: <https://doi.org/10.1016/j.tcr.2021.100432>

Posted at the Zurich Open Repository and Archive, University of Zurich

ZORA URL: <https://doi.org/10.5167/uzh-201165>

Journal Article

Published Version

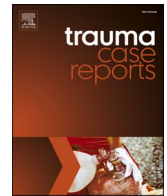


The following work is licensed under a Creative Commons: Attribution-NonCommercial-NoDerivatives 4.0 International (CC BY-NC-ND 4.0) License.

Originally published at:

Scherer, J; Schäfer, F P; Kobe, A R; Messmer, F; Pape, H-C; Rauer, T (2021). Ordinary injury, big surprise - Traumatic false aneurysm and arteriovenous fistula of the posterior tibial artery after civilian trauma: A case report. *Trauma Case Reports*, 32:100432.

DOI: <https://doi.org/10.1016/j.tcr.2021.100432>



Case Report

Ordinary injury, big surprise – Traumatic false aneurysm and arteriovenous fistula of the posterior tibial artery after civilian trauma: A case report

J. Scherer^{a,*}, F.P. Schäfer^a, A.R. Kobe^b, F. Messmer^b, H.-C. Pape^a, T. Rauer^a

^a University Hospital of Zurich, Department of Traumatology, Rämistr. 100, 8091 Zürich, Switzerland

^b University Hospital of Zurich, Department of Diagnostic and Interventional Radiology, Rämistr. 100, 8091 Zürich, Switzerland

ARTICLE INFO

Keywords:

Traumatic arteriovenous fistula
False traumatic aneurysm
Trauma
Civilian
Posterior tibial artery

ABSTRACT

Introduction: False traumatic aneurysm (FTA) or pseudoaneurysm and traumatic arteriovenous fistulas (TAVF) are rare pathologies in civilian trauma and mainly result from stabs or gunshot wounds. The posterior tibial artery as site of trauma is very rare.

Presentation of case: We report on a 39-year old female patient who was suffering from combined FTA and TAVF of the posterior tibial artery after falling into a wine glass. CT-imaging as well as duplex ultrasound and selective arteriography were performed, and two stent-grafts were inserted.

Discussion: Based on the presented case, incidence of the described pathology, treatment options and outcomes are discussed.

Conclusion: Adequate imaging in penetrating wounds to the extremities is crucial in order to provide diagnosis and treatment of concomitant lesions.

Introduction

The incidence of false traumatic aneurysm (FTA) and traumatic arteriovenous fistula (TAVF) is difficult to determine [1]. These injuries, under civil conditions are common pathologies due to stabs and missile wounds. However, FTAs and TAVFs can also occur by secondary movement of bone fragments or in blunt trauma [2,3]. Traumatic false aneurysms and arteriovenous fistulas are mainly associated with injuries of the lower extremity [1,4–6]. If the arterial injury occurs shortly after trauma, a prompt repair of the damaged vessel should be performed [5,7–10]. In this case report, we describe a rather rare case of FTA combined with a traumatic AVF after civil, accidentally self-inflicted penetrating trauma to the posterior tibial artery.

Case report

We report on a 39-year-old obese, intoxicated female who presented herself at our surgical emergency department. She had fallen into a wine glass, and subsequently complained about a big contused lacerated wound on her dorsolateral right lower leg and a smaller anterior wound with fragments of broken glass in situ. Initially, the patient was seen in a local hospital and was then transferred to our department. The externally performed computed tomography angiography revealed 2 small foreign bodies within the peroneal

* Corresponding author.

E-mail address: julian.scherer@usz.ch (J. Scherer).

compartment, one big foreign body in between the fibula and the tibia and a lesion of the posterior tibial artery suspicious of a traumatic false aneurysm (Fig. 1). The patient reported combined intoxication due to the intake of 3 glasses of red wine, 20 mg of Zolpidem and several tablets of Diazepam during the afternoon. On examination, a 10 cm flesh-wound over the dorsolateral part of the lower leg, decreased sensitivity of the superficial peroneal nerve from the right instep to the fifth toe, a normal motor activity and normal peripheral perfusion was seen (Fig. 2). There were no clinical signs of imminent compartment syndrome. Due to the anamnestic information provided and after clinical examination, we performed a duplex sonography of the arteries of the right leg, which showed a 2.2 cm lesion of the posterior tibial artery with both, arterial and venous signals. Laboratory diagnostics revealed a stress induced leukocytosis. The decision was made to take the patient to the operation theatre under general anesthesia for evacuation of the glass fragments, further intraoperative diagnostics and wound closure. After closure of the lateral wound, we extended the smaller wound surgically, prepared the penetrated fascia and evacuated the glass fragments (Fig. 3). On exploration, no obvious neural damage was apparent and due to the injury-given access, we decided against further exploration to avoid additional damage. We then closed the wounds and placed a wound drainage. Intraoperative imaging revealed no remaining foreign bodies (Fig. 4). Postoperatively, the patient recovered well with no impairment of peripheral perfusion or movement in clinical examination. On the first postoperative day, an angiography was performed which showed a 2.4×2 cm measuring FTA and a further distal TAVF, both in the proximal third of the posterior tibial artery. We then placed two overlapping stent-grafts and the final angiography showed normal blood flow to the distal arteries and total exclusion of the FTA and TAVF (Fig. 5).

Postinterventional antithrombotic procedure included a single loading dose of 300 mg Plavix® orally on the first postinterventional day, 75 mg Plavix® orally once daily for the consecutive 30 days as well as life-long intake of Aspirin® 100 mg once daily.

In clinical follow-up, three weeks after the operation, the patient showed a regular course of healing with intact peripheral perfusion and no evidence of persisting arterial damage. Furthermore, no evidence of deep venous thrombosis or motoric restriction was present. The initially reported hyposensitivity of the superficial peroneal nerve was still present, but, according to the patient, the loss of sensory was regredient since discharge. Since intraoperative findings did not show any obvious neural damage and the patient reported ongoing sensory recovery, we interpreted the present hyposensitivity as neurapraxia according to *Seddon* due to contusion and soft-tissue swelling [12].

Discussion

We presented a case of civilian FTA in combination with TAVF of the posterior tibial artery after a fall into a wine glass. FTA and TAVF are common pathologies associated with war injuries such as gun shots or stabs [1]. Reported incidences of TAVF and FTA of 6,8% up to 21,2% in civilian patients with arterial lesions can be found in the literature [1,13]. Therefore, exact incidences of the above-mentioned arterial injuries are rather difficult to determine, but it seems that injury to the posterior tibial artery occurs seldomly [1,14,15]. False traumatic aneurysms are due to tangential trauma to the inner wall of the artery, through which blood continues to flow [16]. Traumatic arteriovenous fistulas are frequent complications of arterial trauma [17]. Both, FTA and TAVF can be clinically unapparent [14,18]. Our patient also did not show any signs of arterial lesions or abnormal distal arterial pulses. After wound-closure, the initial sensory loss was clinically not detectable anymore. Immediate intervention is required for both, FTA and TAVF in order to prevent limb threatening hemorrhages, proximal dilatation of the vessels, edema and ulcerations [18,19].

The time interval between injury and clinical presentation may vary from days to several years [20]. In our case, the FTA and TAVF were clinically not present and therefore were an incidental finding in the initial CT-imaging followed by duplex ultrasound. Previous studies have shown the importance of ultrasound and CT-scans in patients with penetrating wounds to the extremities and some authors even suggest performing angiographic imaging routinely [17,21]. Treatment options range from ultrasound compression, surgery, thrombin injection and radiological intervention [22–24]. We treated the presented FTA and TAVF with stent-grafts. While TAVF and TFA in the 1970s and 1980s were primarily treated surgically, however, non-invasive treatment options have become more popular in the past decades. Selective angiography and embolization or stenting is considered as cost-effective with low complication-rates and no excessive incisions and therefore has low rates of infections to the affected limb [18]. Endovascular management of FTA is the gold standard and also TAVF can be treated with selective angiography and stent-grafting [18,25]. Traditionally, TAVF should be managed surgically as soon as possible [19]. Since our patient was suffering from both FTA and TAVF, we aimed to address both lesions

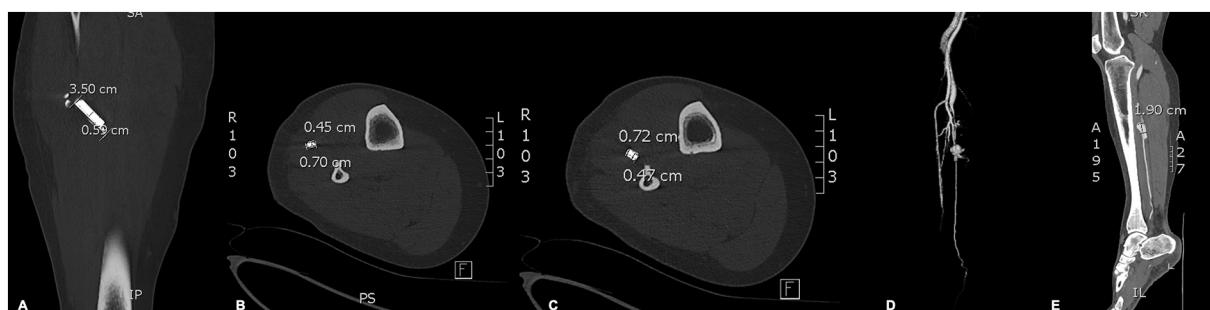


Fig. 1. Preoperative external CT-scan: A–C: Glass particles in situ, D: 3D-reconstruction showing suspicious traumatic arteriovenous malformation of the posterior tibial artery, E: CT-angiography showing lesion to the posterior tibial artery.



Fig. 2. Wound on examination. Small arrow: Big contused lacerated wound located on the anterolateral right lower leg, big arrow: small wound located on the anterior right lower leg.

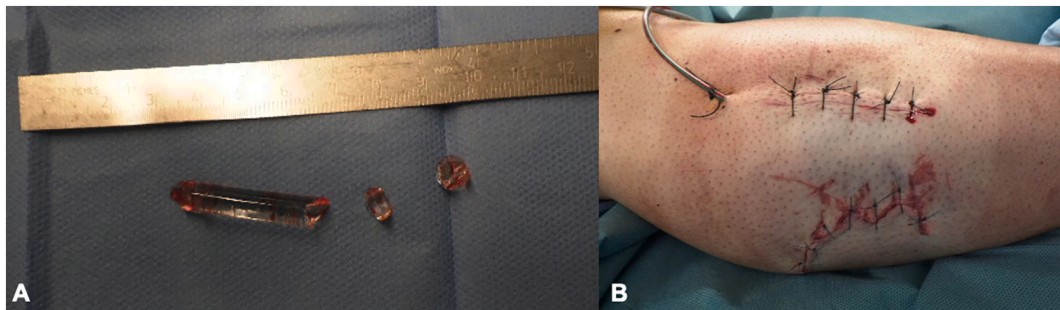


Fig. 3. A: Evacuated glass fragments, B: postoperative photography.

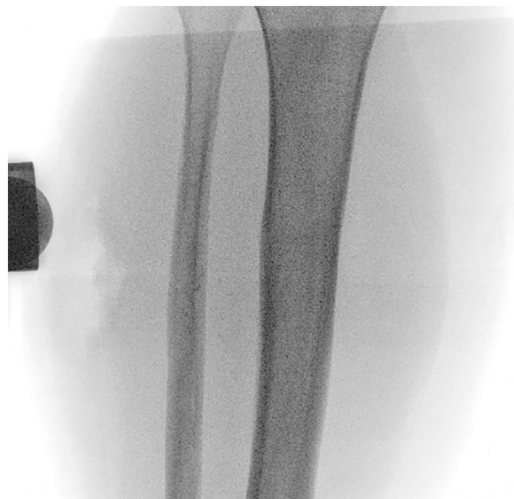


Fig. 4. Intraoperative imaging after evacuation of the foreign bodies.

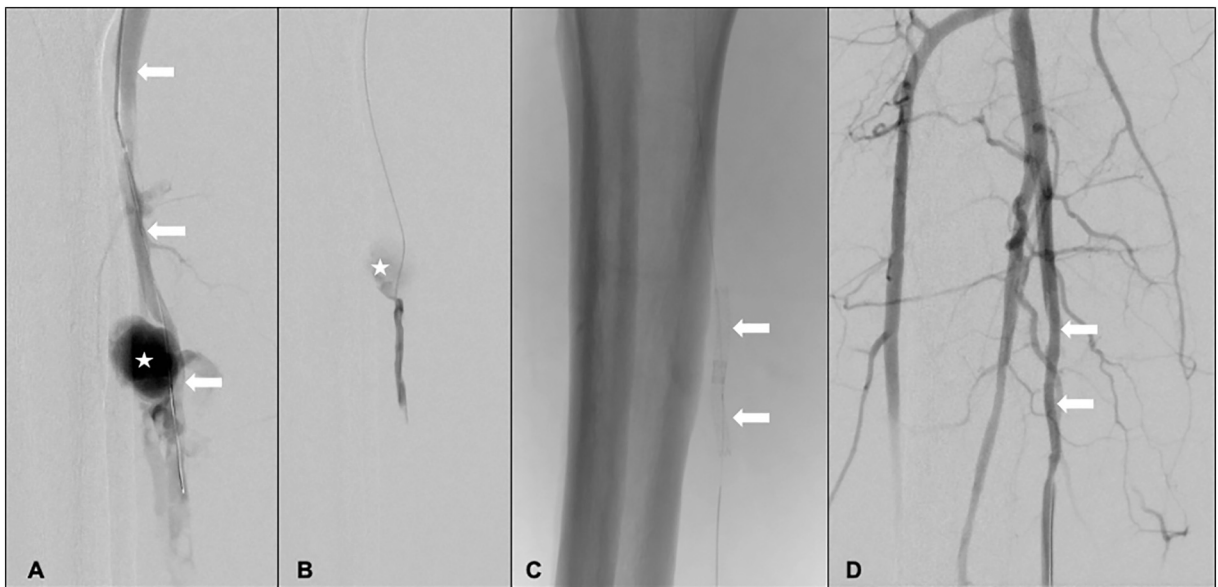


Fig. 5. Panel A shows the false aneurysm of the posterior tibial artery (star) and prompt filling of the accompanying vein (arrow). After selective placement of a 2.7Fr microcatheter into the posterior tibial artery distal to the false aneurysm (star) a retrograde flow into the aneurysm was found (Panel B). Panels C and D show the final result after stent-graft placement (arrow; Bentley BeGraft 3 mm × 24 mm and 4 mm × 24 mm) with exclusion of the FTA and TAVF and normal, antegrade flow in the posterior tibial artery.

in one session minimally invasively. A large review has shown that overall postoperative complications are rarely observed, and that endovascular stenting is superior to invasive surgery due to lower morbidity and mortality rates, shorter hospital stay and preservation of venous grafts for autologous bypass-surgery [26,27].

Conclusion

The reported case emphasizes the importance of adequate initial imaging in penetrating wounds to the extremities, due to the missing clinical signs of concomitant injuries. The underlying report also shows the feasibility of endovascular treatments in traumatic pseudoaneurysms and traumatic arteriovenous fistulas of the greater limb arteries.

Funding

No source of funding.

Ethical approval

Not applicable.

Consent

Written informed consent was obtained from the patient for publication of this case report and any accompanying images.

Declaration of competing interest

No conflict of interest is reported by the authors.

References

- [1] L.B. Davidovic, et al., False traumatic aneurysms and arteriovenous fistulas: retrospective analysis, *World J. Surg.* 35 (6) (2011) 1378–1386.
- [2] J.V. Robbs, et al., Traumatic arteriovenous fistula: experience with 202 patients, *Br. J. Surg.* 81 (9) (1994) 1296–1299.
- [3] D.L. Gillespie, N.L. Cantelmo, Traumatic popliteal artery pseudoaneurysms: case report and review of the literature, *J. Trauma* 31 (3) (1991) 412–415.
- [4] C.W. Hughes, E.J. Jahnke Jr., The surgery of traumatic arteriovenous fistulas and aneurysms: a five-year follow up study of 215 lesions, *Ann. Surg.* 148 (5) (1958) 790–797.
- [5] N.M. Rich, R.W. Hobson 2nd, G.J. Collins Jr., Traumatic arteriovenous fistulas and false aneurysms: a review of 558 lesions, *Surgery* 78 (6) (1975) 817–828.
- [6] R.D. Patman, E. Poulos, G.T. Shires, The management of civilian arterial injuries, *Surg Gynecol Obstet* 118 (1964) 725–738.

- [7] A. Megalopoulos, S. Siminas, G. Treloupoulos, Traumatic pseudoaneurysm of the popliteal artery after blunt trauma: case report and a review of the literature, *Vasc. Endovasc. Surg.* 40 (6) (2007) 499–504.
- [8] L. Davidovic, et al., Post-traumatic AV fistulas and pseudoaneurysms, *J. Cardiovasc. Surg.* 38 (6) (1997) 645–651.
- [9] F. Linder, Acquired arterio-venous fistulas. Report of 223 operated cases, *Ann. Chir. Gynaecol.* 74 (1) (1985) 1–5.
- [10] R.L. Treiman, et al., Early surgical repair of acute post-traumatic arteriovenous fistulas, *Arch. Surg.* 102 (6) (1971) 559–561.
- [12] H.J. Seddon, A classification of nerve injuries, *Br. Med. J.* 2 (4260) (1942) 237–239.
- [13] R.L. Hewitt, A.D. Smith, T. Drapanas, Acute traumatic arteriovenous fistulas, *J. Trauma* 13 (10) (1973) 901–906.
- [14] K.R. Kollmeyer, et al., Acute and chronic traumatic arteriovenous fistulae in civilians. Epidemiology and treatment, *Arch. Surg.* 116 (5) (1981) 697–702.
- [15] L.B. Davidovic, et al., Civil and war peripheral arterial trauma: review of risk factors associated with limb loss, *Vascular* 13 (3) (2005) 141–147.
- [16] S.I. Schwartz, *Principles of Surgery: PreTest Self-assessment and Review*, McGraw-Hill, Health Professions Division, 1999.
- [17] K. Nagpal, K. Ahmed, R. Cuschieri, Diagnosis and management of acute traumatic arteriovenous fistula, *Int. J. Angiol.* 17 (4) (2008) 214–216.
- [18] B. Mohan, et al., Endovascular management of traumatic pseudoaneurysm: short & long term outcomes, *J. Clin. Orthop. Trauma* 8 (3) (2017) 276–280.
- [19] T. Nara, et al., Perioperative management of biventricular failure after closure of a long-standing massive arteriovenous fistula, *Can. J. Anaesth.* 48 (6) (2001) 588–591.
- [20] A. Laohapoonrungruengsee, Y. Sirirungruangsarn, O. Arpornchayanon, Pseudoaneurysm of profunda femoris artery following internal fixation of intertrochanteric fracture: two cases report, *J. Med. Assoc. Thail.* 88 (11) (2005) 1703–1706.
- [21] J.K. Chen, P.T. Johnson, E.K. Fishman, Diagnosis of clinically unsuspected posttraumatic arteriovenous fistulas of the pelvis using CT angiography, *AJR Am. J. Roentgenol.* 188 (3) (2007) W269–W273.
- [22] M. Paschalidis, et al., Randomised comparison of manual compression repair versus ultrasound guided compression repair of postcatheterisation femoral pseudoaneurysms, *Heart* 92 (2) (2006) 251–252.
- [23] G.B. Danzi, et al., Compression repair versus low-dose thrombin injection for the treatment of iatrogenic femoral pseudoaneurysm: a retrospective case-control study, *Ital. Heart J.* 6 (5) (2005) 384–389.
- [24] D.M. Olsen, et al., A prospective study of ultrasound scan-guided thrombin injection of femoral pseudoaneurysm: a trend toward minimal medication, *J. Vasc. Surg.* 36 (4) (2002) 779–782.
- [25] A.S. Kendrick, L.R. Sprouse 2nd, Repair of a combined femoral pseudoaneurysm and arteriovenous fistula using a covered stent graft, *Am. Surg.* 73 (3) (2007) 227–229.
- [26] F. Raherinantenaina, et al., Management of traumatic and iatrogenic arterial pseudoaneurysms in a tropical environment, *J. Med. Vasc.* 42 (6) (2017) 338–348.
- [27] S.Y. Lee, S.J. Lee, C.S. Lee, Traumatic popliteal artery pseudoaneurysm developed during a soccer game, *Korean J. Thorac. Cardiovasc. Surg.* 44 (4) (2011) 298–300.